

STUDIES ON THE GENUS *BIDENS* L. (COMPOSITAE) FROM THE EASTERN  
HEMISPHERE. 5. A NEW SPECIES FROM BURUNDI

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ABSTRACT

*Bidens ruyigiensis* T.G.J. Rayner, a species known only from Ruyigi Province, southeastern Burundi, is described as new. It is shown to possess close affinity with *B. burundiensis* Mesfin, a taxon with which it shares a number of characters including the presence of blunt setae on the ventral face of the cypselas and a well developed cypselial corona. The two species are readily distinguished by their leaf and capitulum morphology.

KEY WORDS: *Bidens*, Compositae, taxonomy, Burundi

The examination of African material for an ongoing revisional study of Eastern Hemisphere *Bidens*, partly in connection with the preparation of an account of the genus for the *Flora of Tropical East Africa*, has uncovered another new species from eastern Africa.

*Bidens ruyigiensis* T.G.J. Rayner, *sp. nov.* TYPE: BURUNDI. Ruyigi Province, Mpinga, 3° 45' S 30° 10' E, 12 Jun. 1976, *M. Reekmans 5304* (HOLOTYPE: C; Isotypes: BR,MO,PRE).

*Bidens praecox* auct. non Sherff: Lisowski, *Fragm. Florist. Geobot.* 36(1), suppl. 1:169. 1991, typ. excl.

Species nova affinitatem praebens *Bidenti burundiensi* Mesfin ob setas obtusas in superficie ventrali cypselarum, sed ab ea imprimis differt plantis annuis, foliis similaribus omnibus, pro maxima parte marcidis sub anthesi, capitulis 1.5-3.9 centrimetris diametro, phyllariis exterioribus uniseriatis minus quam decem 0.5-0.7 millimetris latis, flosculis radii 2.3-5.2 millimetris latis ad apicem

regularibus integris aut 2-3-dentatis, corollis flosculorum disci 1.3-1.8 millimetris longis 0.7-0.9 millimetris latis lobis quattuor aut quinque, antheris 1.2-2.1 millimetris longis, filis staminum 0.6-1.5 millimetris longis, coronis apicalibus cypselae torum simulantibus.

Annual herbs, to 26-55 cm tall; stems solitary, arising from a short (to 0.4-1.5 cm long) taproot with numerous, long, slender, much-branched adventitious roots; stems inclined to suberect at base, erect above, terete especially below to rounded-tetragonal above, 1.1-2.3 mm diam. near base, not or slightly woody below, few-branched usually only in upper 2/3; stems and branches smooth or shallowly to deeply sulcate chiefly above, faintly striate, pale to dark brown, glabrous below, usually sparsely pilose above with minute (0.05-0.20 mm long), adpressed to suberect, antrorse, straight to flexuous, uniseriate, few-cellular hairs; branches erect or suberect, more or less obtuse-angled tetragonal, 1.2-2.1 mm diam. at base, 0.8-1.5 mm diam. beneath peduncles. Leaves decussate, mostly withered by anthesis below branches, petiolate; lamina (1-)-2-pinnatipartite, with (3-)-5-7 segments, narrowly to broadly ovate or elliptic-ovate to broadly trullate-ovate in outline, more rarely broadly transverse ovate, (1.2-)-2.0-4.8 cm long  $\times$  (0.7-)-1.1-3.1(-3.9) cm wide; primary leaf segments opposite or more rarely subopposite, antrorsely inserted at ca. 45° to rachis, pinnatipartite, rarely undivided, narrowly trullate-ovate to narrowly oblong-ovate or sometimes more or less irregular in outline, 0.6-3.1 cm long  $\times$  0.5-1.4 cm wide; lobes opposite or alternate, generally thickened and slightly involute at margin, linear to narrowly oblong, often slightly attenuated toward apex, rarely narrowly obovate-linear, acute to subobtuse and usually somewhat callose-indurated at apex, occasionally apiculate, entire at margin, 0.5-3.3 cm long  $\times$  0.8-1.3 mm wide, papyraceous, green, glandular punctate, glabrous or sparsely to subdensely hispid on margins and nerves beneath, with minute (0.05-0.10 mm long), antrorse and more or less adpressed hairs; rachis linear to narrowly obtriangular-linear, 0.4-1.8(-2.3) mm wide, more or less canaliculate or flattened and slightly involute at margin; petioles to 1.8-21.0 mm long  $\times$  0.15-3.80 mm wide, usually somewhat canaliculate, unwinged or, especially for leaves subtending branches and peduncles, somewhat broadly winged, usually gradually dilated above and below and more or less narrowly oblong with concave margins, sometimes broadest toward apex and more or less narrowly obtriangular, glabrous or rarely sparsely pilose beneath; bases clasping and connate. Capitula radiate, heterogamous, erect, 1.5-3.9 cm diam.  $\times$  3.2-4.6(-6.5) mm high at anthesis, to 8.2 mm high in fruit, solitary at branch apices or 2-3(-5) in extremely lax cymes; receptacles flat or slightly convex at anthesis, usually becoming somewhat convex in fruit; peduncles to (2.5-)-5.0-15.0 cm long, very slender, 0.3-0.6 mm diam. at anthesis, to 1.1 mm diam. in fruit, more or less obtuse-angled tetragonal, shallowly to somewhat deeply sulcate, mostly faintly striate, sparsely to subdensely pilose especially on an-

gles, rarely densely pilose chiefly toward apex; ebracteate or with 1-2(-3), alternate, usually undivided bracts, intermediate between the leaf lobes and outer phyllaries. Involucre cupuliform, 3.0-5.1 mm diam. at anthesis, becoming depressed-hemispheric and to 13 mm diam. in fruit, subsparingly to densely pilose at base; outer phyllaries uniseriate, 4-8(-9), narrowly oblong and slightly dilated at base to narrowly ovate-oblong or narrowly obspatulate-oblong, acute and shortly apiculate at apex, entire at margin, 2.3-4.9 mm long  $\times$  0.5-0.7 mm wide at anthesis, to 8.4 mm long  $\times$  to 1.2 mm wide in fruit, erect to somewhat spreading in fruit, green, usually with a narrow, paler margin, with 3-7 pairs of red-brown nerves, subglabrous or sparsely to densely hispid-pilose chiefly on margin and at base of dorsal surface; inner phyllaries uniseriate, fused to 1/3 of length, (7-)8, elliptic-ovate to narrowly elliptic or narrowly to somewhat broadly oblong-obovate, gradually to subabruptly narrowed above, subacute to more or less rounded at apex, entire at margin, 3.3-4.9 mm long  $\times$  1.0-1.9 mm wide at anthesis, to 8.9(-9.2) mm long  $\times$  to 2.9 mm wide in fruit, erect, membranous, basal half pale to dark stramineous or pale brown, apical half dark brown, pale stramineous at margin, with 17-numerous brown nerves, sparsely to more or less densely pilose chiefly toward base, apex puberulous. Ray florets (6-)8, neuter; ovary obovate-elliptic to narrowly oblong, 0.4-3.7 mm long  $\times$  0.3-0.7 mm wide, glabrous, minutely biaristate, style absent; corolla tube 1.3-1.8 mm long, sparsely to somewhat densely pubescent, occasionally with isolated glandular hairs; ray yellow, elliptic-oblong, 6.1-18.3 mm long  $\times$  2.8-5.2 mm wide, with 8-12 darker nerves, glabrous or sparsely pubescent beneath toward base; apex entire and acute to obtuse, or 2-3-dentate with teeth 0.3-0.6 mm long  $\times$  0.3-0.7 mm wide. Paleae narrowly elliptic-oblong or obovate-oblong to obovate, acute to broadly obtuse at apex, entire at margin, 2.8-5.3 mm long  $\times$  0.6-1.5 mm wide at anthesis, to 7.7 mm long in fruit, membranous, glabrous or minutely hispid-pilose on upper part of dorsal surface, pale yellow, often dark brown toward apex, with 4-9 pairs of red-brown nerves. Disc florets 18-31; corolla yellow, glabrous or lobes dorsally sparsely pubescent; limb campanulate, 1.3-2.0 mm long  $\times$  0.7-0.9 mm diam., not annularly thickened, apex 4-5-lobed; lobes triangular or ovate-triangular, acute to obtuse at apex, 0.4-0.5 mm long  $\times$  0.3-0.5 mm wide at base, papillate on margin; limb gradually or subabruptly attenuated below into a narrow, 0.4-0.9 mm long  $\times$  0.3-0.4 mm wide, terete tube; anthers 1.2-2.1 mm long  $\times$  0.25-0.40 mm diam., dark brown to black; endothecial tissue with polarized thickening; apical appendages ovate-triangular, subacute to obtuse at apex, 0.2-0.3 mm long  $\times$  0.25-0.30 mm wide, margins reflexed; basal appendages sagittate, just reaching or slightly exceeding base of the filament collar; collar 0.15-0.20 mm long  $\times$  0.10-0.15 mm wide; filament 0.6-1.5 mm long, flat or slightly involute; style 2.4-3.7 mm long, slightly tapered at base, with caudate, 0.5-0.7 mm long branches; stylopodium cupuliform or cylindric. Cypselas unwinged; body narrowly obovate-oblong or more or less narrowly elliptic-oblong and

TABLE 1. Morphological differences between capitula of *Bidens ruyigiensis* and *B. burundiensis*.

	<i>B. ruyigiensis</i>	<i>B. burundiensis</i>
<i>Capitula</i>		
diam. at anthesis	1.5-3.9 cm	3.2-4.9 cm
<i>Outer phyllaries</i>		
no. of series	1	2
no.	4-8(-9)	(6-)10
width at anthesis	0.5-0.7 mm	1.2-3.3 mm
<i>Inner phyllaries</i>		
width at anthesis	1.0-1.9 mm	1.6-4.1 mm
<i>Ray florets</i>		
width	2.8-5.2 mm	6.2-12.1 mm
no. nerves	8-12	(9-)11-18
apex shape	regular	irregular
<i>Disc florets</i>		
corolla size	1.3-2.0 × 0.7-0.9 mm	2.9-5.6 × 1.2-1.9 mm
no. lobes at apex	4-5	5
anther length	1.2-2.1 mm	3.4-5.8 mm
filament length	0.6-1.5 mm	1.8-3.1 mm
<i>Cypselas</i>		
apical corona	torus-shaped	broadly cupuliform

gradually attenuated toward base, 3.8-5.1 mm long × 0.6-0.9 mm wide, dark grey, compressed; dorsal face strongly convex, sometimes irregularly so, with a broad, cartilaginous, pale brown, apical shoulder, glabrous or rarely with a few, erect, blunt, uniseriate, few-cellular, ca. 0.1 mm long setae; ventral face flat or slightly concave, with a raised median rib, sparsely to densely setose just below apex; both faces 8-striate-sulcate; apex surmounted by a corona, glabrous, exaristate; corona torus-shaped, stramineous, cartilaginous, slightly ventrally produced, 0.5-0.6 mm diam. × 0.15-0.20 mm tall; base of cypselas with a short (ca. 0.1 mm long), cartilaginous, flap-like carpopodium.

PARATYPES: BURUNDI. Ruyigi Province, Mpinga, 30 Apr. 1972, *M. Reekmans 1851* (BR,EA,MO).

*Bidens ruyigiensis* is presently known only from the type locality in south-

eastern Burundi. Reekmans described it as growing at 2000 m in "steppe rocheuse" with *Exotheca*.

It is closely related to *Bidens burundiensis* Mesfin, a taxon with which it shares a character unique within the genus, namely the presence of minute, blunt setae near the apex of the ventral face (and rarely also the dorsal face) of the cypselas. Both species also possess a well developed, cartilaginous, cypselial corona. In addition the inner phyllaries of the fruiting capitula of both taxa are, at least in the apical half, dark brown or black with a much paler margin. The two species are readily distinguished, however, by their leaf morphology. In *B. ruyigiensis* the leaves are all alike, 1-2-pinnatipartite, cauline, and mostly withered by anthesis on the basal part of the stem. In *B. burundiensis* the leaves are dimorphic. The basal ones are pinnatipartite with linear segments or rarely undivided and linear, and crowded into a rosette, whereas the upper cauline leaves are undivided, narrowly ovate and often subulate toward the apex. *B. ruyigiensis* also differs from the perennial *B. burundiensis* by its annual life-form. Furthermore, the species show a number of differences in capitula characters (see Table 1).

The sheets of Reekmans 1851 and 5304 at BR were cited for *Bidens praecox* Sherff by Lisowski (1991) in his account of *Bidens* for *La Flore d'Afrique Centrale*. This species was described by Sherff (1931) from a single specimen (Busse 2523 at B) collected in southeastern Tanzania. Although this specimen was destroyed during World War II, a duplicate is extant at EA. A comparison of this specimen with the two collections of *B. ruyigiensis* shows them to differ in a number of significant ways. In *B. praecox* the leaf lobes are ovate or somewhat trullate and 3.4-14.2 mm wide (more or less linear and 0.8-1.3 mm wide in *B. ruyigiensis*), the outer phyllaries are dilated above (not gradually attenuated above) and the cypselas are 6.3-8.1 mm long (not 3.8-5.1 mm long) with a capitate corona (not torus-shaped corona).

Mesfin has surprisingly determined specimens of Reekmans 1851 as *Bidens lineariloba* Oliv., a taxon which resembles *B. ruyigiensis* only superficially, primarily in habit and leaf morphology. *Bidens lineariloba*, however, is instantly and easily distinguished by its cypselas. In flowering specimens these possess two apical, more or less erect, retrorsely barbed aristae. In fruiting capitula they are rigid, shiny, 3.4-6.2 mm long and, uniquely within African species of the genus, arranged more or less perpendicularly to the axis of the fruit body.

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